CLAIMS

1. A process for the polymerization of an ethylenically unsaturated monomer comprising:

a. providing a supported metallocene catalyst comprising a stereospecific metallocene catalyst component supported on a polyamide support comprising spheroidal polyamide support particles having an average particle size within the range of 5-60 microns and having an alkylalumoxane co-catalyst component supported on said polyamide support by reaction of said alkylalumoxane and said polyamide support; and

b. contacting said catalyst in a polymerization reaction zone with an ethylenically unsaturated monomer containing three or more carbon atoms or which is a substituted vinyl compound and maintaining said reaction under polymerization conditions to produce polymerization of said monomer to produce a stereoregular polymer.

2. The process of claim 1 wherein said polyamide support particles have an average particle size within the range of 10-30 microns.

3. The process of claim 1 wherein said stereospecific metallocene catalyst component comprises at least two stereospecific metallocenes.

4. The process of claim 1 wherein said ethylenically unsaturated monomer is a C_3 or C_4 alpha olefin.

5. The process of claim 4 wherein said alpha olefin is propylene.

6. The process of claim 5 wherein said alkylalumoxane is predominantly supported on the outer surface of said polyamide particles.

7. The process of claim 4 wherein said catalyst is contacted with ethylene to produce an ethylene propylene co-polymer.

8. The process of claim 1 wherein said metallocene is characterized by the formula:

$$R''(Cp_aR_n)(Cp_bR'_m)MeQ_p$$

wherein Cp_a is a substituted cyclopentadienyl ring, Cp_b is an unsubstituted or substituted cyclopentadienyl ring; each R is the same or different and is a hydrocarbyl radical having 1-20 carbon atoms; each R′ is the same or different and is a hydrocarbyl radical having 1-20 carbon atoms; R″ is a structural bridge between the cyclopentadienyl rings imparting stereorigidity to

the catalyst and is selected from the group consisting of an alkylene radical having 1-4 carbon atoms, a silicon hydrocarbyl radical, a germanium hydrocarbyl radical, a phosphorus hydrocarbyl radical, a nitrogen hydrocarbyl radical, a boron hydrocarbyl radical, and an aluminum hydrocarbyl radical; Me is a group 4b, 5b, or 6b metal from the Periodic Table of Elements; each Q is a hydrocarbyl radical having 1-20 carbon atoms or is a halogen; p is from 0 to 3, m is from 0 to 3, n is from 1 to 4; and wherein R'm is selected such that ($Cp_bR'm$) is a sterically different ring than (Cp_aR_n).

9. The process of claim 8 wherein R is selected such that (Cp_aR_n) forms a substituted or unsubstituted fluorenyl group.

10. The process of claim 9 wherein Me is titanium, zirconium, hafnium, or vanadium.

11. The process of claim 10 wherein R" is a methylene, ethylene, organosilyl, substituted methylene, or substituted ethylene radical.

12. The process of claim 11 wherein R"(CpR_n)(CpR'_m) forms an isopropylidene (cyclopentadienyl-1-fluorenyl) radical or a diphenylmethylene (cyclopentadienyl-1-fluorenyl) radical.

13. The process of claim 10 wherein R is selected such that (Cp_aR_n) forms a substituted fluorenyl radical having bilateral symmetry and R' is selected such that (Cp_bR_m) forms an alkyl substituted or unsubstituted cyclopentadienyl radical having bilateral symmetry.

14. The process of claim 1 wherein $R''(CpR_n)(CpR'_m)$ forms an isopropylidene (cyclopentadienyl-1-fluorenyl) radical or a diphenyl methylene (cyclopentadienyl-1-fluorenyl).

15. A process for the preparation of a supported metallocene catalyst comprising:

a. providing a particulate catalyst support material in the form of generally spheroidal polyamide particles having an average particle size within the range of 5-60 microns;

b. contacting said particulate polyamide support material with an alumoxane co-catalyst in an aromatic hydrocarbon solvent under conditions in which said alumoxane and said polyamide react with a preponderance of said alumoxane being retained on said polyamide support;

c. recovering said alumoxane containing polyamide support particles from said hydrocarbon solvent;

d. providing a dispersion in an aromatic hydrocarbon solvent of a stereospecific metallocene incorporating a metallocene ligand structure having two sterically dissimilar cyclopentadienyl ring structures coordinated with a central transition metal atom; at least one of said cyclopentadienyl ring structures being a substituted cyclopentadienyl group which provides an orientation with respect to said transition metal atom which is sterically different from the orientation of the other cyclopentadienyl group with respect to said transition metal atom, and both of said cyclopentadienyl groups being in a relationship with each other providing a stereorigid relationship relative to said coordinating transition metal atom to prevent rotation of said ring structures;

e. mixing said metallocene solvent dispersion and the product produced by the reaction of said particulate catalyst support material and alumoxane for a period of time to allow said metallocene to become reactively supported on said particulate support to form a

supported catalyst; and

f. recovering said supported catalyst from said aromatic solvent.

16. The process of claim 15 wherein prior to contacting said polyamide support with alumoxane, said polyamide support is dried in an inert atmosphere at an elevated temperature.

17. The process of claim 15 wherein said polyamide support material and said alumoxane co-catalyst are contacted under conditions in which gas is evolved with the reaction of said alumoxane and said polyamide.

18. The process of claim 15 wherein the polyamide support particles recovered in subparagraph (c) are dried at an elevated temperature to produce a powder formed of said polyamide support particles prior to mixing said particles with said metallocene solvent dispersion.

19. A supported metallocene catalyst composition comprising:

a. a particulate organic support comprising spheroidal polyamide support particles having an average diameter within the range of 5-60 microns and having an alkylalumoxane co-catalyst supported on the surface of said polyamide support by reaction of said alkylalumoxane and said polyamide support; and

b. a stereospecific metallocene supported on said particulate support and incorporating a metallocene ligand structure having two sterically dissimilar cyclopentadienyl ring structures coordinated with a central transition metal atom; at least one of said cyclopentadienyl ring structures being a substituted cyclopentadienyl group which provides an orientation with respect to said transition metal atom which is sterically different from the orientation of the other cyclopentadienyl group with respect to said transition metal atom, both of said cyclopentadienyl groups being in a relationship with each other providing a stereorigid relationship relative to said coordinating transition metal atom to prevent rotation of said ring structures.

20. The composition of claim 19 wherein said polyamide support particles have an average surface area of less than 50 m^2/g.

21. The composition of claim 19 wherein said stereospecific metallocene catalyst component comprises at least two stereospecific metallocenes.

22. The composition of claim 19 wherein said stereospecific metallocene catalyst component comprises a syndiospecific metallocene.

23. The composition of claim 19 wherein said stereospecific metallocene catalyst component comprises an isospecific metallocene.

24. The composition of claim 19 wherein of the polymerization sites provided on said transition metal atom are located predominately on the outer surfaces of said polyamide support particles.

25. The composition of claim 24 wherein said polyamide support particles have an average diameter within the range of 10-30 microns.

26. The composition of claim 24 wherein said stereospecific metallocene is characterized by the formula:

$$R''(Cp_aR_n)(Cp_bR'_m)MeQ_p$$

wherein Cp_a is a substituted cyclopentadienyl ring, Cp_b is an unsubstituted or substituted

cyclopentadienyl ring; each R is the same or different and is a hydrocarbyl radical having 1-20 carbon atoms; each R'_m is the same or different and is a hydrocarbyl radical having 1-20 carbon atoms; R" is a structural bridge between the cyclopentadienyl rings imparting stereorigidity to the catalyst and is selected from the group consisting of an alkylene radical having 1-4 carbon atoms, a silicon hydrocarbyl radical, a germanium hydrocarbyl radical, a phosphorus hydrocarbyl radical, a nitrogen hydrocarbyl radical, a boron hydrocarbyl radical, and an aluminum hydrocarbyl radical; Me is a group 4b, 5b, or 6b metal from the Periodic Table of Elements; each Q is a hydrocarbyl radical having 1-20 carbon atoms or is a halogen; $0 \leqq p \leqq 3$; $0 \leqq m \leqq 4$; $1 \leqq n \leqq 4$; and wherein R'_m is selected such that $(Cp_bR'_m)$ is a sterically different ring than (Cp_aR_n).

27. The composition of claim 26 wherein R is selected such that (Cp_aR_n) forms a substituted or unsubstituted fluorenyl group.

28. The composition of claim 27 wherein Me is titanium, zirconium, hafnium, or vanadium.

29. The composition of claim 28 wherein $R''(CpR_n)(CpR'_m)$ forms an isopropylidene (cyclopentadienyl-1-fluorenyl) radical or a diphenylmethylene (cyclopentadienyl-1-fluorenyl) radical.